THE VETERINARY RECORD

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888

No. 30. JULY 23, 1949 VOL. 61.

DISEASES OF NEW-BORN FOALS

I. Haemolytic Disease due to Iso-Immunisation of Pregnancy

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Introduction

The syndromes in the new-born characterised by jaundice may be divided into two types, usually termed icterus (neonatorum) gravis and simplex, respectively. One form of icterus gravis associated with severe haemolytic anaemia in new-born foals will be described in this paper. Thanks to the collaboration of the Department of Pathology at Cambridge it has been possible, using the newer serological techniques (Coombs, Mourant and Race, 1946), to establish that the syndrome is due to an incompatible blood group reaction between the mother and the foetus known as iso-immunisation of pregnancy, and similar to rhesus factor disease in man. An account of the principal findings in a series of six cases has been reported elsewhere (Coombs, *et al.*, 1948). However, it seemed desirable to present a brief report stressing the clinical observations since this joint investigation represents the first occasion upon which the iso-immunisation of pregnancy in European horses has been reported.

1. ISO-IMMUNISATION OF PREGNANCY IN MAN.

The recognition of the disease process known as iso-immunisation of pregnancy has followed rapidly on the discovery in 1939 of an atypical immune agglutinin in a woman after a still-birth and the demonstration by Landsteiner and Weiner (1940) of agglutinogens in human blood which reacted with an anti-rhesus monkey red cell serum and hence called the rhesus (Rh) factor.

Briefly, a mother who does not carry a certain red blood cell antigen may become immunised by this antigen and develop an antibody against it in her serum. Immunisation occurs either by the transfusion of blood containing the antigen or during pregnancy. The latter process may occur if the foetus carries a particular antigen inherited from the sire, which is absent in the mother. The foetal antigen crosses the placenta and immunises the mother, who develops an antibody in her serum. This antibody may pass back through the placenta and cause disease of the foetus; it is also present in the colostrum and milk. The antibody may cause haemolysis in the foetus, a reaction which is accentuated when the babe sucks the mother and ingests milk antibody. In addition to haemolytic disease of the new-born, this disease process causes hydrops foetalis, erythroblastosis and kernicterus, and is often associated with still-birth of the foetus.

Different red blood cell antigens vary in their ability to cause iso-immunisation disease. In man the antigens of the Rh group are mainly responsible. However, only some 5 to 10 per cent. of the pregnancies following marriages from which one might anticipate iso-immunisation disease actually show clinical ill-health. It has been suggested that there is a protective mechanism at work, whose precise nature is at present not fully understood (Cappell, 1948).

2. ISO-IMMUNISATION DISEASE IN EQUIDAE.

Icterus gravis of new-born mules has been recognised as an important cause of deaths of new-born mules in Poitou and Southern France from time immemorial (Bessis, 1947). It was attributed to a *Nuttalia equi* infection (Donatien, *et al.*, 1924) but the evidence for this was not satisfactory (Brumpt, 1947). Caroli suggested it might be an iso-immunisation disease (Caroli and Bessis, 1947 a, b,) and these authors were able to establish this diagnosis by appropriate serological evidence (Bessis, 1947).

That iso-immunisation disease might be responsible for icterus gravis in foals had occurred to several workers in this country and the U.S.A. The American group reported during the 1947 foaling season on five cases in which the diagnosis was based on simple agglutination tests only (Bruner, *et al.*, 1948a). These workers have examined further cases during the 1948 season (Bruner, *et al.*, 1948b). Haemolytic jaundice of thoroughbred foals has been a recognised entity in this country for some years, and while it seemed probable that it was related to jaundice neonatorum of new-born infants, an opportunity to investigate it did not occur until 1948.

The Syndrome of Haemolytic Disease

1. CLINICAL OBSERVATIONS.

The six cases observed this year have all been thoroughbred horses; none of the mares or sires has been closely related and the stallions have been different in every case. All the mares had previously produced normal living foals. One mare had a foal with haemolytic disease, diagnosed on clinical grounds only, three years ago by another sire, but she produced a normal foal by a third stallion in 1947. The mares, aged seven to 20 years, have been normal and the parturitions uneventful, usually to term, although two were overdue one or two days and one case 14 days. The animals have been housed in warm loose boxes bedded on wheat straw.

All the foals have been normal at birth and for some hours after, being active and sucking strongly. From eight hours to five days after birth the first clinical signs have been observed. Haemoglobinuria has been the first sign in the severe cases, but it has not been present in those less severe. Lassitude, disinclination to suck as long or as vigorously as normal, and progressive weakness have ensued and have in some cases been the first indication of ill health. At the same time pallor of the mucous membranes together with icterus have been noticeable; this latter sign has often been prominent, but in one peracute case dying within eight hours of birth icterus was only just perceptible on *post-mortem* examination, although marked haemoglobinuria was present.

The condition has been essentially afebrile, although the body temperature has been 102-3 deg. F. on occasions.

The appetite has been affected only late in the disease; if a weak foal was held up it would suck readily for a short time, and foals treated by transfusion have proceeded to suck within a few minutes of the transfusion being completed.

Cardiovascular signs have coincided with the pallor and general weakness. Increased heart frequency has been present in all cases, reaching 180 beats per minute in severe ones. The cardiac impulse at rest has been readily palpable and in severe cases the movements against the chest wall have been visible from several yards. The cardiac sounds have been augmented, both in amplitude and the area of audibility; they were quick, metallic in quality, and with a systolic thrill over the left base, particularly well marked posteriorly. The apical beat has been perceptible over an enlarged area, in some cases as far back as the tenth rib (the normal limit in thoroughbred foals is about rib 7). The peripheral pulse has been of small amplitude and virtually imperceptible. In severe cases a well-marked positive cardiac jugular pulse has been present.

The respiration has been normal in frequency, amplitude and character, except when severe anaemia was present, *i.e.*, with haemoglobin levels of 3.5 gm. per cent. or less, when the breathing became hyperpnoeic and finally dyspnoeic with frequencies at 80 per minute, and yawning occurred. Peripheral oedema has been rare, being confined to one case only with a slight transient oedema of the hind fetlocks. There have been no signs of special involvement of the nervous system. Postural and spinal reflexes, the gait and the functioning of the special senses have been normal, until the profound weakness of the terminal stages occurred.

Urination and defaecation have been normal, although in the cases surviving for any length of time constipation has been apt to develop. The urine has been dark in most cases, due to excessive quantities of bile pigment, while samples from cases in which the haemolytic process has been acute and severe have been a dark red " port wine " colour, and gave positive reactions for protein and haemoglobin.

2. Haematological Findings.

The haemoglobin and red blood cell counts have shown a progressive anaemia, the severity of which has in any individual case closely followed the severity of the clinical signs. Reticulocytes have been observed very occasionally, and even in cases during early recovery, no significant reticulocytosis has been detected. The red blood cells have been essentially normal and of uniform size; poikilocytosis, anisocytosis, spherical forms and nucleated cells have been absent. In blood samples collected into dry oxalate (mixed potassium and ammonium salts) the red blood cells have shown a marked tendency to haemolyse with very slight agitation, *i.e.*, there would appear to be a greatly enhanced fragility of many red blood cells. The red blood cell sedimentation rate has been extremely rapid; and the red cells have shown considerable " pseudo-auto-agglutination " or clumping in their own plasma at room temperature. The " pseudo-auto-agglutination " and increased fragility have made many red blood cell counts unreliable.

The leucocyte counts have been within the normal limits of about 8-15 thousand per cu. mm. and no markedly abnormal cells have been detected. The majority have been polymorphonuclear leucocytes with a tendency towards non-segmented forms.

3. Pathology.

At autopsy pallor of the internal organs and the muscles was general, especially in the peracute cases. Icterus was always present but was inconspicuous in the peracute cases. The biliary tract was patent and the liver a normal colour without marked congestion, except in the most peracute case when there was some hepatic enlargement. The spleen has varied; in the peracute rapidly fatal cases splenomegaly was marked, the spleen weighing 1,200 gm. in the most severe case (normal 400-500 gm.) and 800 gm. in the other case dying rapidly. The splenic pulp in these cases was very dark and of a " blackberry jam " consistency, which exuded from the cut surface. In another peracute case, which was kept alive for 13 days by repeated blood transfusions, the spleen was atrophic (220 gm.). The femoral bone marrow was red throughout in the foals dying within the first week of life; the tibial marrow examined in one case (a peracute one) had a yellow middle portion.

There was no excessive fluid in the body cavities and the blood was clotted in the great vessels. The heart was normal; subepicardial and subendocardial haemorrhages were absent and there was no sign of " bruising " of the myocardium or of compression fracture of the thoracic wall. The lungs and kidneys showed no macroscopic abnormality. The adrenals were normal without signs of erythropoietic foci. The brain and meninges (they were examined as far back as the second cervical vertebra) showed no gross damage. The cerebro-spinal fluid was bile-stained but icteric staining of the brain substance was inconstant; in the fresh preparation the only observable staining was of the grey matter of the cerebral hemispheres, but after fixation in 10 per cent. formol saline a generalised faint lemon-yellow tinge was apparent without any part showing a particular affinity.

The microscopic changes were not marked. The liver showed signs of damage in cases living several days. In the kidneys of three of the four cases coming to autopsy there was an extension of the tubular epithelium of the first convoluted tubule into the glomerular capsule and there was tubular damage in those surviving for some days. The spleen was engorged with blood. There was no evidence of cerebral damage, of extramedullary blood formation, or of agglutination thrombi in small blood vessels.

4. Course of the Disease.

Of the six cases four have died, while two recovered completely without specific therapy. These cases may be divided into peracute, acute and subacute types.

The peracute type occurred 8-36 hours after birth with the clinical signs of severe anaemia due to very rapid intravascular haemolysis; haemoglobinuria and pallor of membranes were marked but icterus was slight. The three cases of this type died. At autopsy the spleen was grossly enlarged.

The acute type occurred two to four days after birth. The clinical signs were similar to those of the peracute type except that the haemolytic anaemia was slower in onset; the principal signs were jaundice with pallor of the membranes. The one case of this type died.

The subacute type developed clinical signs on the fourth or fifth day; jaundice was more conspicuous than the pallor and haemoglobinuria was absent. Two subacute cases recovered without specific therapy

5 Serology.

Only a brief résumé of the serological examinations will be given; for a full account the reader should consult the paper by Coombs, *et al.* (1948).

The sera of the dams were tested for the presence of immune iso-antibodies against the red cells of a panel of horses including certain of the sires of affected foals. The sera of five control horses contained no immune iso-antibodies, while the sera of the six dams of cases of haemolytic disease gave reactions which probably indicate the presence of immune iso-antibodies belonging to more than one antigen-antibody system. Samples of the colostrum and milk from some of these dams were also shown to contain immune iso-antibodies.

The red cells of the foals were examined by the direct antiglobulin sensitisation test and Diamond's albumin tube test. The results showed that *in vivo* iso-sensitisation was present in all six cases of haemolytic disease, but was absent in three cases of jaundice due to other causes. The direct sensitisation test, which is very satisfactory for the diagnosis of haemolytic disease in new-born infants, may be used, with appropriate modifications, equally well in the disease in new-born foals.

Diagnosis

The diagnosis of haemolytic disease of the new-born foal due to iso-immunisation of pregnancy rests on two factors, the appraisal of the clinical features, and confirmation by suitable serological techniques, without which an unequivocable diagnosis is impossible.

The cardinal clinical features as we have observed them are the appearance of ill-health only after the ingestion of colostrum, *i.e.*, the foal is normal at birth. Thereafter at periods from eight hours to five days signs of intravascular haemolysis—haemoglobinuria, pallor of membranes, icterus, lassitude and cardiovascular insufficiency—develop. The mortality without specific treatment is high.

The syndrome should be distinguished from:—

(*a*) *physiological icterus* of the new-born, which occurs at the same age but is much less severe, without mortalities and often associated with retention of the meconium; and

(*b*) *infective syndromes* in which icterus and lassitude may be prominent. However, the signs of intravascular haemolysis are absent and the autopsy findings—petechial haemorrhages, prominent malpighian corpuscles in the spleen, and hepatic degeneration—suggest a septicaemia and invite bacteriological examination.

The serological evidence rests on the demonstration of absolute iso-sensitisation of the foal's cells *in vivo*, using the direct sensitisation test (see Coombs, *et al.*, 1948).

Treatment and Blood Transfusion

1. Principles of Treatment.

The effects of severe intravascular haemolysis are twofold; first, the anaemia, if severe and prolonged, may cause irreparable harm to the circulation and central nervous system, and, second, various organs, especially the kidneys and liver, may be damaged by the disease process and the degradation products of the haemolysed cells. Blood transfusion will correct the anaemia, while a high intake of fluids will do much to reduce the damage to the kidneys, etc. The principles underlying our treatment have therefore been, firstly, by general management and nursing to prevent where possible further ingestion of antibody but to maintain the food intake of the foal; secondly, by supportive therapy to maintain the fluid intake, combat constipation and, if necessary, provide anti-bacterial substances against secondary infection, and thirdly, where deemed necessary, by transfusion to replace the foal's haemolysed red blood cells.

(*a*) *General Management.*—As no foster-mothers were available to provide milk free from the particular antibody, we allowed our foals to continue sucking their dams in spite of the risk of their further absorbing antibody. This risk was considered to be less than that of immediately weaning the foal and feeding it on cow's milk adjusted to conform approximately to the composition of mare's milk.

(*b*) *Supportive Therapy.*—If the foal was not sucking well, 200-400 mls. of fluid—normal saline with 4 per cent. glucose and 3 per cent. sodium bicarbonate added—was given by stomach tube once or twice daily. Liquid paraffin enemata were used to combat constipation. In the cases requiring blood transfusion, a dose of tetanus anti-toxin was given subcutaneously and antibiotics as required, penicillin and sulphamezathine to combat any general febrile reaction, and sulphaguanidine if the stools became loose.

(*c*) *Blood Transfusion Therapy.*—This was carried out in two very severe cases, one peracute and one acute, and involved 13 transfusions. After each transfusion a remarkable improvement in the condition of the foal occurred; a prostrate foal would be on its feet and sucking within ten minutes.

2. Blood Transfusion Therapy.

(1) *Selection of a Suitable Donor.*—To be suitable a donor's blood should not produce any immediate transfusion reaction and should not be haemolysed by the antibody causing the iso-immunisation. The information available on these problems is extremely meagre. The ordinary blood-groups responsible for transfusion reactions in the horse have been reviewed by Fourie (1935). German workers (Hallswachs, 1938; Hoch, 1938) recognised six groups, and suggested that reactions may be expected with some 15 per cent. of bloods selected at random. Since no reference sera were available to us, we considered that the risk of such immediate transfusion reactions was a justifiable one to take. There remained the problem of finding a donor whose blood was not haemolysed *in vivo* by the antibody in the foal's blood; a simple slide agglutination test was quite unreliable. Later in the investigation our serologist colleagues were able to suggest one suitable donor on the basis of their laboratory investigations.

Owing to these difficulties we used the dam's red blood cells, washed free of plasma and resuspended in saline, which would contain no antigen to react with the antibody.

(2) *Preparation of Bloods for Transfusions.*—A small trochar and canula (bore 8 mm.) was inserted into the donor's jugular vein through a small procaine wheal after a bleeding cord had been placed around the lower neck. At first the blood was conveyed to the collecting bottle (National Blood Transfusion Service waisted bottle of about 600 ml. capacity) by rubber tubing and attachments making an air-tight joint, but we found this method cumbersome and blockage by clot too apt to occur. Therefore we collected the jet of blood directly into the bottle which contained about 50-60 ml. of glucose citrate. 450 ml. of blood were collected, the bottle gently rotated and stored at 4 deg. C. The stored blood kept for about five days. Eight bottles were collected from a mare initially.

To prepare washed red blood cells the citrated blood was centrifuged for 20 minutes and the supernatant fluid aspirated. The packed red blood cells were then washed by adding a similar volume of sterile normal saline, the whole shaken, re-centrifuged and the supernatant fluid aspirated. This washing was repeated. The washed packed red blood cells were then suspended in a fluid medium ready for transfusion. The suspending media

were either normal saline (seven occasions) or citrate-glucose (two occasions). At first a volume of suspending medium equal to, or rather more than, that of the packed red blood cells was used, giving a final packed cell volume of about 40-50 per cent (normal 30-35 per cent.), but later a more concentrated suspension (packed cell volume about 65 per cent.) was used by adding two volumes of packed red blood cells to one volume of suspending medium. The washed resuspended red blood cells showed considerable haemolysis within 12 hours even when stored at 4 deg. C. The donor blood therefore was stored whole and the washing carried out shortly before use.

(3) *Technique of Transfusion in the Foal.*—We have used the standard human apparatus (National Blood Transfusion Service) as a gravity feed with the glass drip chamber and a 2 mm. bore needle. The needle has been inserted into the left saphenous vein where it passes upwards over the proximal and medial aspects of the tibia towards the stifle joint. The foal has been restrained by manual means in the dam's box. The time for the transfusion has been between 30 and 45 minutes.

The volume of the transfusion required depends on the severity of the anaemia. From our small series of observations, on thoroughbred foals of 50-60 kg., the blood haemoglobin (Hb) level may be often 3 gm. per cent. or below before the clinical signs are severe, while at an Hb level of 4.5 gm. per cent., the clinical signs have largely disappeared. Thus the problem is to raise the blood Hb level from 3 to 4.5 gm. per cent. without overloading the circulation. To raise the Hb level 1 gm. per cent. requires about 500 ml. of citrated whole blood, *i.e.*, about 750 ml. are required in all at the first transfusion to raise the Hb to a safe level. The transfusion of such a large volume is not without danger and may cause circulatory embarrassment with pulmonary engorgement and oedema, early signs of which we have observed on one occasion. To reduce the risk of increasing the circulating blood volume too far, we have used concentrated suspensions of dam's red blood cells which have enabled us to raise the blood erythrocyte level further for a smaller increase in the total blood volume.

We would suggest for the present that the volume transfused should be limited to about 10 ml. per kg. body weight at any one time or within a period of 12 hours, *i.e.*, 500-600 ml. for a thoroughbred foal, if the transfusion time is about 30 minutes.

Rates of Transfusion of 120 drops per minute were tolerated well, even when the foal had been repeatedly and severely anaemic for some days. Slower rates are preferable if the animal will remain quiet for the longer period, especially at the beginning of a transfusion in the very severely affected cases. When the transfusion has alleviated the most severe cardiovascular signs and the heart frequency is down to 120 per minute, it is permissible to increase the transfusion rate a little.

(4) *Results of Transfusion Therapy.* — Transfusion therapy has been used in two cases, both of which were severely affected. We were able to prolong life without preventing death. No immediate transfusion reactions were noted with any of the transfusions.

In an acute case (Case 4) two transfusions were given of whole blood from a donor selected by the slide agglutination test, but the blood was subsequently found by serological tests to be positive to the haemolytic disease antigen group. One transfusion of 450 ml. of this citrated blood was given over 18 minutes immediately after collection. There was a marked improvement in the foal's condition: prior to the transfusion the foal was prostrate, unable to rise; immediately after the transfusion was completed the foal got to its feet and attempted to suck the dam. Four hours later the foal had relapsed somewhat and a further 425 ml. of citrated blood was given over 15 minutes. The foal rallied and got to its feet unaided, but died four hours later.

The second case (Case 3) was of the peracute type; its life was maintained for 12 days by repeated transfusions of washed dam's red blood cells on nine occasions and of whole blood from an unrelated donor on one occasion (see Fig. 1). The transfusion always produced an immediate and marked improvement in the clinical condition and the moribund foal would rise to its feet unaided and within an hour would be sucking strongly. This improvement, which coincided with the improved blood haemoglobin levels, was sustained for 24-36 hours when a relapse occurred. With the later transfusions the period became shorter and we thought that some degree of renal insufficiency was developing, although the urine contained no protein. This case is illustrated in Fig. 1.

The autopsy confirmed the renal damage. The kidneys were grossly enlarged (400 gm. each compared with the normal 120 gm.), were soft and the cortex was stained a deep greenish-brown "gun-metal" colour; the medulla was unstained. The spleen was atrophic (200 gm.). The heart was enlarged, pale and with several greenish infarcts in the myocardium. There were small haemorrhagic areas in the lungs, which otherwise were normal. The left saphenous vein was occluded by thrombo-phlebitis at the transfusion site. Microscopically, the kidneys showed considerable accumulation of pigment and some tubular casts, as well as a cubical to low columnar metaplasia of the capsular epithelium at the entrance of the tubule in the majority of the glomeruli. The liver showed an early cirrhosis with loss of liver cells, and enlargement of the portal spaces due to the presence of swollen cells with pale greyish-brown crenolated cytoplasm and proliferating pseudo-bile canaliculi. The bone marrow showed active haemopoiesis.

The blood samples from this case showed an unusual phenomenon. When allowed to stand immediately after collection the red blood cells sedimented very rapidly in 10 to 15 minutes, and, if a transfusion had been given within 24 hours, two distinct layers of red blood cells were present, separated by a thin "buffy" layer of leucocytes. The upper red blood cell layer was extremely fragile; if the sample was agitated gently, especially after four or six hours in the refrigerator, this upper layer could be seen to disintegrate rapidly, while the lower red blood cell layer remained intact. In transporting samples to the haematological laboratory, this upper layer nearly always disintegrated completely.

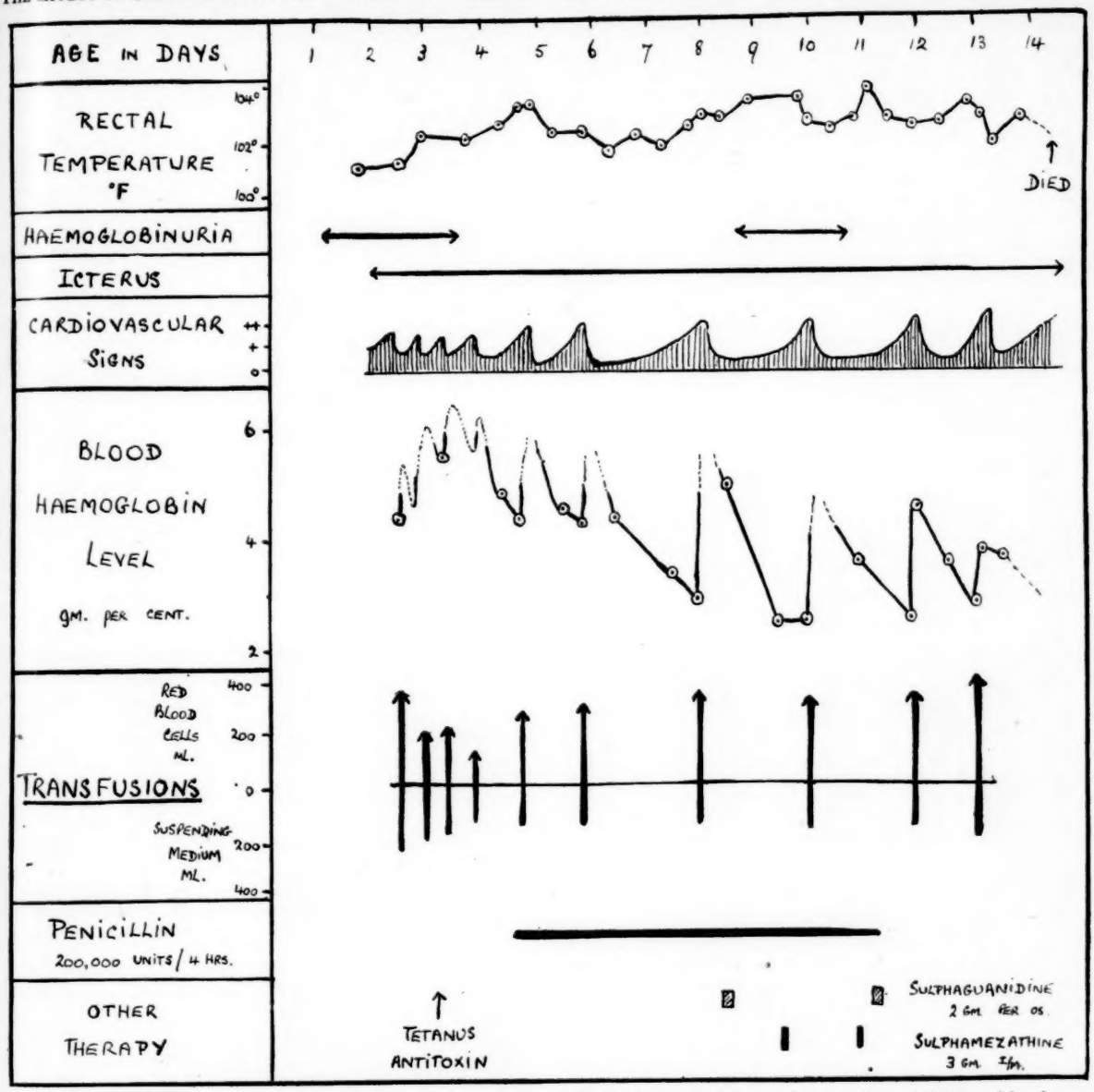
Discussion

1. The Disease Process.

The serological evidence, in particular the use of the direct sensitisation test, establishes for the first time that haemolytic disease due to iso-immunisation of pregnancy occurs in new-born foals in this country. The clinical and pathological observations support the view that it is an acute haemolytic anaemia occurring, as far as the limited data shows, after birth and caused by the absorption from the foal's alimentary tract of unchanged antibody secreted in the dam's colostrum and milk. The clinical signs, the initial lassitude and weakness followed by cardiovascular disturbances, are those of severe anaemia (Lambie, 1937); the pathological findings are consonant

FIG. 1.

THE EFFECT OF SIMPLE BLOOD TRANSFUSIONS ON PROLONGING THE LIFE OF A FOAL WITH PERACUTE HAEMOLYTIC DISEASE



This foal (Case 3) was affected with the peracute type of the disease when 24 hours old. Without blood transfusion it was expected to die on the third day. With blood transfusions the foal lived for 14 days, and its health was apparently normal between the relapses.

with a severe haemolytic process, with icterus due to the rapid accumulation of bile pigments beyond the excretory capacity of the liver.

The division of these cases into three types on clinical grounds is supported by the pathological data. In type 1, which is fatal in a few hours, the haemolysis is extremely acute and severe for a few hours only; the body is quite unable to deal with the haemoglobin freed from the haemolysed red blood cells and a marked haemoglobinuria ensues and is the first clinical sign. Death, probably from anaemic anoxia, occurs before the icterus has had time to develop fully. The spleen is grossly enlarged and the presenting autopsy sign is pallor rather than icterus.

In type 2, which is also fatal, the haemolysis, although severe, is less rapid. Haemoglobinuria is less prominent and icterus well developed. Death occurs more slowly than in type 1 but in the same manner. The spleen is not so enlarged and the presenting sign at autopsy is icterus rather than pallor.

In type 3, from which recovery is spontaneous, the haemolysis, although still severe, is much less acute, so that the rate of blood regeneration is sufficiently rapid to

keep abreast of the haemolysis. Haemoglobinuria is absent. The prinicipal signs are lassitude and icterus.

The pathological findings in the three cases dying quickly were essentially those of a simple haemolytic process, and are very similar to those observed in the mule (Bessis, 1947). The data on case 4, which was kept alive for 12 days by transfusion, suggest, however, that severe liver and kidney damage occurs if these organs are exposed to the disease process for more than three or four days. In this case aplasia of the bone marrow was apparently not responsible for the failure to overcome the anaemia. The myocardial infarcts were probably due to emboli derived from the obliterating thrombo-phlebitis of the saphenous vein; while the clinical evidence does not suggest they caused any important reduction of the myocardial reserve, they do represent one risk of repeated intravenous transfusions in a subject in which struggling during injection is so liable to occur, with consequent trauma of the vein at the transfusion site.

We have found no evidence in our foals of various pathological conditions reported in iso-immunisation disease of man. There was no thrombosis due to agglutination, such as Weiner and Brody (1946) have reported. No kernicterus or other signs of involvement of the central nervous system, no erythroblastaemia, and no extramedullary blood formation were found, while transient oedema of a very mild degree was seen in one case only. These findings are essentially in agreement with those found in uncomplicated haemolytic anaemia in babies (Parsons and Baar, 1948).

The precise relationship between the dam's serum antibody titre, the colostrum antibody titre, the degree of iso-sensitisation of the foal's red cells, and the amount of subsequent haemolysis is not well understood at the present time. As in man (Mollison & Cutbush, 1949), the degree of iso-sensitisation as revealed by the direct sensitisation test is apparently not related quantitatively to the subsequent haemolysis. Bruner, *et al.* (1948b), have observed a similar disparity between haemolysin and simple agglutination titres in one of their mares. The factors which determine the haemolysis of sensitised foal's red cells require further elucidation; the increased sedimentation rate and fragility we have observed indicate profound changes at the surface of the erythrocyte.

2. Treatment.

Two aspects of treatment call for comment, the question of the dam suckling the foal and the best method of transfusion therapy. A right decision on the question whether to allow a foal to continue to suck its dam or not involves knowledge of two things—how long the mare continues to secrete antibody in her milk and how long the foal's alimentary tract will continue to absorb undigested antibody. We had no precise information on either of these matters. However, it seems probable that after the fourth or fifth day the danger to the foal of continuing to suck the dam is small. Cases occurring during the first three days of life are probably best placed on a foster-mother, if one is available. It is interesting that the dam of one subacute case, which recovered spontaneously, was losing colostrum freely from the udder for two days before parturition.

Simple transfusion therapy has provided dramatic improvement in two cases, but in neither was it successful. In the first case this was probably due to poor technique and commencing the therapy too late. In the second the haemolytic process was so powerful, presumably due to the large quantities of potent haemolytic antibody in the foal, that simple transfusion failed to arrest the process before irreparable tissue damage had occurred. Apart from the work involved, repeated simple transfusions are not an adequate form of therapy for such cases. An alternative is exchange transfusion or exsanguination transfusion, in which the blood is removed from one vein at approximately the same rate as it is transfused into another until most of the foal's blood is removed. This technique has been used in France and the U.S.A. during the 1948 season, and we had proposed to use it if another peracute case similar to case 3 had occurred. If this technique proves practicable, it would seem to offer the best method of handling transfusion therapy in the field.

There remains the problem of deciding which case requires transfusion and which does not. The serological (direct sensitisation) test provides little guide as to the severity of the disease. In our series two cases of six recovered spontaneously, after transfusion therapy had been withheld against the haematological evidence, on appraisal of the clinical signs alone. However, some method of assessing the probable severity in the early stages would be useful in deciding the necessary therapeutic measures.

The basic problem in transfusion therapy is the rapid selection of suitable donors. The peracute cases die so quickly that immediate transfusion is essential and this does not allow sufficient time to carry out laboratory tests in many cases. The selection in advance of a panel of possible suitable donors and the devising of a simple serological procedure which might be used in the field would be a great step forward. These problems are under investigation.

3. Prevention.

In man the disease is either due to the inheritance of certain antigens on the individual's red blood cells, or is caused by sensitisation of the mother by a previous blood transfusion. In mares the latter possibility is very remote and does not arise as far as our cases are concerned. By analogy with man and mules the disease in the horse is almost certainly hereditary in nature, although the data on the disease in horses are as yet insufficient to prove this conclusively. However, it is reasonable to assume that this will prove to be so and to lay plans accordingly to prevent the disease.

Theoretically, such prevention may be effected either by not making a mating likely to produce iso-immunisation of pregnancy, or if such a mating is particularly required, to arrange for the foal not to suck its dam, but to be reared from birth by a foster-mother or by hand. In either event the crux of the matter is to foretell whether any particular mating is likely to produce iso-immunisation disease. Although much more knowledge will be required before a certain opinion can be given, it is possible to gain some indication from testing the blood of the stallion against that of the mare.

From the practical point of view the disease is not widespread. Although our cases were all thoroughbreds, we suspect from the nature of the clinical syndrome that some ten years ago a number of foals sired by a draught horse stallion were affected. Amongst some 1,200 thoroughbred foalings only six cases, as far we can ascertain, occurred in the Newmarket area in 1948, and the condition does not represent a major cause of thoroughbred foal mortality. It is rare among the offspring of any one sire. An affected mare does not necessarily produce an affected foal in a subsequent pregnancy by another stallion, and we do not know that a subsequent mating similar to the one which has produced an affected foal, will necessarily always produce a diseased foal.

Until much more information is available, it would seem unwise to attempt to eradicate the disease by any drastic alteration of existing breeding practices. In the meantime the careful recording of cases of the disease will allow us to fill in the many gaps in our knowledge. If a diagnosis can be made early there seems every reason to hope that further development of transfusion therapy may save many cases that otherwise would prove fatal.

Summary

1. A disease of new-born foals due to sensitisation of the dam by an antigen from the red blood cells of the foetus, so-called iso-immunisation of pregnancy, is described.

2. The disease in the new-born foal is an haemolytic anaemia due to intravascular haemolysis, probably following the ingestion of antibody in the colostrum or early milk from the sensitised dam.

3. The diagnosis has been established by appropriate serological tests.

4. The technique of treatment by blood transfusion is described.

5. The selection of suitable blood donors is discussed in the light of existing knowledge of blood groups in the horse.

6. Possible methods of prevention and treatment are outlined.

Acknowledgment

We should like to thank our colleagues, Dr. R. R. A. Coombs, Dr. D. H. Heard, Dr. I. T. Hinde and Dr. J. Hoogstraten, of the Department of Pathology at Cambridge, who joined us in this investigation and did so much to make it a success. We are indebted particularly to Dr. Coombs for his help in the preparation of this paper, and to Dr. Walker, of the Regional Blood Transfusion Laboratory, Cambridge, for the loan of transfusion apparatus.

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Weekly Wisdom

If the works of man are to enhance natural beauty, they must not dwarf it. Electricity pylons look grand striding up and down the Italian foothills of the Alps; but they reduce Ivinghoe Beacon to insignificance.—Julian Huxley (*Times* correspondence on the question of a hydro-electric station in Snowdonia).

CLINICAL COMMUNICATION

TREATMENT OF A CASE OF KERATITIS WITH PANNUS FORMATION IN A DOG

ALEXANDER H. HOGG

Blackburn

Introduction.—Keratitis with pannus formation, *i.e.*, vascularisation of the cornea, is an extremely difficult condition to deal with and any hopeful line of treatment is worthy of record. The following case is described for that reason, although up to the present no similar case has presented the opportunity of further trial on identical lines. The final result is not a complete cure but the dog is still under observation even though little hope is entertained of producing any further improvement. However, it is now in a fit state to be discharged with complete satisfaction to all concerned.

Subject.—Mongrel Beardie Collie dog, aged approximately five years.

Symptoms.—The lesion had been in existence about a month to six weeks when first seen and both eyes were affected to a similar degree. The original cause of the condition was unknown and only home treatment had been employed up to the time of the first consultation. There was a well-marked keratitis involving the entire cornea. This was well established and had the greyish-white appearance characteristic of this stage. The interior of the eye was hidden from view completely and the dog was clumsy in movement and kept bumping into objects. On both eyes there was a well-marked central ulcer of the cornea. Vascularisation from the cornea-scleral junction extended inwards as far as the ulcer base. Photophobia was pronounced but little conjunctivitis was present and the only discharge appeared to be an excess of tears.

Treatment.—This has extended over about six months and was as follows.

First Week.—Penicillin eye ointment. Remarks: Considerable improvement in the ulcers and a certain amount of thinning of the keratitis centrally. No change in the pannus.

Next Two Weeks.—Zinc sulphate drops and Neo argentum eye ointment. Remarks: Ulcers healing nicely. Keratitis about the same. Pannus no change.

Next Two Months.—A variety of drugs was employed over this period in an attempt to clear the keratitis and pannus. The ulcers healed during the course of this time, leaving only small residual scars centrally placed. The keratitis and pannus remained unaltered and it appeared as if no further improvement was going to be possible. Even severance of the vessels at the cornea-scleral junction was seriously considered. The drugs used included Butyn and Metaphen eye ointment (Abbot Laboratories), Thiazamide eye ointment (May & Baker), perchloride of mercury solution and a solution of common salt. It was felt that what was required was a stimulating and penetrating antiseptic and, accordingly, a solution of silver dinaphthyl methane disulphonate (Viacutin — Ward Blenkinsop & Co.) was prescribed.

For one week.—Viacutin solution (one in eight solution) instilled b.i.d. Remarks: An excellent response was obtained in respect of both the keratitis and pannus.

For a Further Two Weeks.—Treatment with Viacutin continued. Remarks: During the second week the response

appeared to be falling off and, accordingly, the strength of the solution was increased to one in five or six. The keratitis and pannus had now largely cleared from the central area of the ball but a fairly wide peripheral lesion still remained. The dog could now see satisfactorily and had ceased knocking into objects. At this stage the condition again appeared in danger of becoming stationary, therefore an addition was made to the treatment. This consisted of a compound drop which I have used with some success previously in a variety of eye conditions. It consists of three drugs, namely, solution of Arvitin (Hewlett's), guttae sulphacetamide and cod liver oil. This forms an oily brown drop which is easily applied and economical in use.

Next Two Weeks.—Viacutin and the compound drops alternately. Remarks: Slow but gradual improvement.

Next Month.—Compound drops only. Remarks: Improvement maintained.

Next Month.—All treatment stopped in order to note whether any improvement or otherwise would now take place naturally. Remarks: A very slight natural improvement observable. The case at this stage was really fit to discharge, but the owner felt that having gone so far, nothing short of perfection would do. Accordingly, the case is at present still under observation and the sole line of therapy consists in the instillation of a few drops of pure cod liver oil daily. The lesions which now remain consist of slight marginal keratitis with centrally placed ulcer scars. There is also rather more vascularisation of the sclera than normal. It is possible that the latter will disappear with time when all the inflammation which has taken place in the region dies away. The other lesions, however, are probably permanent as is also a slight area of pigmentation which, because of its position, fortunately does not hamper vision.

Discussion.

The turning point in the treatment of this case was the employment of Viacutin solution. This drug is not normally listed as being advised for eye treatment and the dilution employed in this case is greater than that recommended for comparable areas of the body. The dog, however, showed no symptoms of pain during its use even in the strongest concentration. The drug as marketed is a one per cent. solution and I diluted this with water to one in eight up to one in five. A certain amount of care, nevertheless, would appear to be indicated in its use as an eye preparation until more information becomes available, unless the case happens to be one such as the above where the risk was justified. The benefit of the drug appeared to wane after about a fortnight, but the change it produced enabled the condition practically to be cleared up with another preparation.

Champion Cow Trapped in Tank.—For 14 days of intense heat, Overtown Bellflower, five-year-old Ayrshire, supreme milking champion at the last Royal Ulster Show, owned by Mr. James Agnew, of Belfast, was trapped in a small disused tank sunk in the ground nearly a mile from her byre, with nothing to eat but nettles, while a search for her went on all over Ulster. Police had her description and markets were watched, as it was feared she might have been stolen. Her survival is surprising. Firmly wedged between rotten planks which had collapsed under her weight, she was unable to move in the small tank, which is roughly only the length and breadth of her body and about 5 ft. deep. Before she was lost her average milk yield was more than six gallons a day, and but for her mishap she would have given milk until next April. Now she will give none until late next year.

NEW INSTRUMENTS AND APPLIANCES

SPLINT FOR FIXATION OF OS CALCIS FOLLOWING TARSAL FRACTURE

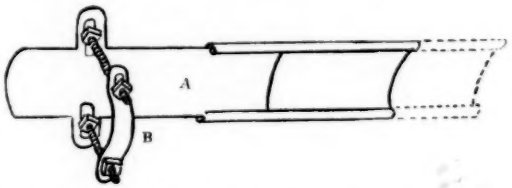
E. MIDDLETON PERRY, C.B.E., F.R.C.V.S.

Wimbledon

Many of my brother practitioners who have to deal with the racing greyhound have doubtless experienced the difficulty which arises in keeping the Os Calcis in place after fracture of the tarsus.

With the object of helping to overcome this difficulty I have devised a splint which I am hoping will prove of considerable assistance.

Before describing the splint, however, I should like to point out that there is no long list of failures or successes to record; on the other hand, I feel that the idea is worth placing before those who are interested in order that they may try it if they wish without waiting, maybe—and I sincerely hope so—some considerable time before I have the opportunity of treating any further patients. Suffice it to say, then, that although my experience is limited to two cases, both of which healed satisfactorily with the Os Calcis in its normal position, the idea would appear sufficiently promising to warrant further trial.



The body (A) of the splint, which is adjustable to the requisite length, is placed down the back of the leg from the point of the hock to the large pad. A strip slightly larger than the splint, of chiropodist's felt (adhesive side placed on the splint) forms a satisfactory and comfortable pad when the splint is fastened in place by two or more bands of adhesive plaster encircling both the splint itself and the tarsal and metatarsal bones. Or, if preferred, it can of course be embedded in plaster of paris.

With the animal under general anaesthesia, an incision is made through the tissues immediately in front of and just below the head of the Os Calcis, and through it the cross piece (B) is inserted, to be secured by the side-screws, which are then adjusted so that the Os Calcis is held in position. Lock-nuts fasten the side screws to the body of the splint.

The lower portion of the leg is bandaged more or less permanently. As a dressing for the upper portion, a small piece of lint covered with ointment and placed between side-screws and leg, will be found to facilitate removal of screws and cross-piece for cleansing periodically. But so far I have not found it necessary to touch the body of the splint. In fact, in each of the two cases treated it was left in place for six weeks, though I think this could be reduced considerably, even down to a month.

With the object of finding something a little more resilient than stainless steel, of which the cross piece is made, I am hoping next time to try some form of plastic material, but it would be on the same principle, the plastic passing through two screws with loops at the ends, then

ABSTRACTS

[Pathogenesis of Bovine Mastitis. I.—The Relation of Age to Streptococcic Infection. Spencer, G. R. & Kraft, M. E. (1949.) *Amer. J. vet. Res.* **10.** 115.]

Bacteriological examinations were made at intervals on quarter milk samples from each cow in 12 Holstein-Friesian herds. The conditions of management of each herd were observed over a period of one to seven years, and particular attention was paid to the degree of segregation of infected animals, milking order and methods, sanitation and feeding practices.

The incidence of streptococcal infection of the mammary gland varied from 60 per cent. to 80 per cent. in the majority of herds, and was low in two herds and high in ten. A regular increase in the incidence of infection occurred with advancing age, particularly during the first four years of lactation, but at different rates in the various herds. In the ten herds having a high incidence of infection, the frequency with which infection was encountered during the first year suggested a very rapid rate of infection during the first few months of lactation. In one herd the figures obtained demonstrated a regular, progressive increase in the incidence of infection at a rate of about 20 per cent. for each successive three-month period, the incidence in this herd approaching 100 per cent. in 12 months.

The rate of increase of infected animals was correlated with herd management practices affecting the degree and duration of exposure of animals to infection, and the size of a herd appeared to be of significance also; the incidence of streptococcal udder infection in large herds, despite better management, was higher than in small herds. The findings, which are discussed fully, emphasised the importance in the control of streptococcal mastitis of milking younger animals first, sanitation, disinfection and segregation to reduce exposure to infection, and the replacement of infected animals with healthy heifers.

C. A. E. B.

* * * *

[Oestrogens in Grass and their Possible Effects on Milk Secretion. Bartlett, S., Folley, S. J., Rowland, S. J., Curnow, D. H., & Simpson, Sylvia A. (1948.) *Nature.* **162.** 845.]

Studies of variations in the composition of cows' milk have revealed a progressive decline in the non-fatty solids content during the winter months followed by an immediate and substantial rise, associated with an increase in milk yield, when the cows go out to grass. Attempts to simulate the effects of spring grass by extra rations of various sorts during winter have been unsuccessful. The observations of Bennetts and co-workers in Australia that certain reproductive disturbances in ewes were due to the presence of oestrogenic substances in pasture, taken in conjunction with the findings by Folley that the administration of oestrogens in suitable doses would increase the solids content of cows' milk, led the authors to investigate the possible presence of oestrogenic substances in pastures in this country. Extracts of a few herbage samples were prepared and tested for oestrogenic activity by their effect on the uterine weight in immature mice. These tests revealed significant quantities of oestrogen in two grass samples collected in May, 1948, and in a clover sample collected in June, 1948. These findings may have an important bearing on problems of lactational and reproductive physiology, and further investigations are being carried out.

A. T. C.

* * * *

[Effect of Young Grass in the Diet on the Onset of Sexual Maturity in Mice. Evans, I. A., & Evans, W. C. (1949.) *Nature.* **163.** 908.]

The authors report that they obtained evidence in 1947 similar to that of Bartlett *et al.* (1948) (see abstract above) of the presence of an oestrogen-like substance in British pasture. Groups of 12 mice were placed on one of the following diets: (*a*) basal laboratory diet; (*b*) basal diet plus fresh grass cuttings *ad lib.* and (*c*) basal diet plus dried grass cuttings. The subsequent growth curves of the three groups did not differ, but the onset of sexual maturity is said to have been hastened in the mice receiving the grass supplements, the mean age at vaginal opening in the three groups being (*a*) 51 ± 3.7 days; (*b*) 41 ± 4.0 days; (*c*) 43 ± 5.0 days. It is postulated that such factors in pasture may play an important role in problems of animal productivity.

A. T. C.

[*Abstractor's Note.*—Assuming, as there is no statement to the contrary, that the " errors " given are the standard errors of the means, statistical examination of the above data shows that neither of the means of the ages of vaginal opening for the two grass-fed groups of mice differs significantly from the mean age at which vaginal opening occurred in the control group. Furthermore, the difference between the pooled mean for the grass-fed groups and the control-group mean does not attain the five per cent. level of significance. Further experiments are therefore called for to establish with reasonable certainty the true interpretation of these results.]

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being brought back to the splint and fastened behind with a lock-nut.

Messrs. A. L. Hawkins, 15, New Cavendish Street, London, W.1, made my splint for me and would, I am sure, co-operate with anyone wishing to try the idea as suggested. May I wish every success to those who do.

Haemolytic Disease of New-born Foals.—In this issue we publish a paper by Messrs. H. B. Parry, F. T. Day and R. C. Crowhurst on haemolytic disease of new-born foals due to iso-immunisation of pregnancy. It deals with the clinical aspect of an investigation undertaken by these authors in collaboration with Messrs. R. R. A. Coombs, D. H. Head, I. T. Hinde and J. Hoogstraten, an account of which has appeared recently in *The Journal of Hygiene.* **46.** 403. Six cases of haemolytic disease in new-born foals, apparently due to iso-immunisation of pregnancy, were investigated from their clinical, serological, haematological and pathological aspects. An important advance reported in this paper is the successful modification by Dr. Coombs and his colleagues of the direct anti-globulin sensitisation test (so-called direct Coombs' test), widely used for the serological diagnosis of iso-immunisation disease in man, for the serological diagnosis of the disease in foals.

Although iso-immunisation disease has been investigated by French and American workers during the past two years, its occurrence in this country has not been established previously, although its presence has been suspected on clinical and pathological grounds for several years. The clinical syndrome, which affords an excellent example of the signs of severe and acute haemolytic anaemia, has not been fully described previously and for these reasons interested readers, who should also consult the article in *The Journal of Hygiene,* will be particularly glad to have the account with which the clinical members of the group of investigators have furnished us.

NEWS FROM OVERSEAS

The publishers of *Veterinary Medicine* announce its sale to Dr. Robert L. Anderes, who has taken possession of the property and assumed responsibility for its continuance. Dr. D. M. Campbell, who initiated this publication as *The American Journal of Veterinary Medicine*, as a successor to *The Missouri Valley Veterinary Bulletin*, in 1910, will continue to give some time to the work until Dr. Anderes has familiarised himself with his journalistic responsibilities.

Dr. Anderes received a B.Sc. degree in dairy husbandry from Kansas State College in 1925 and his D.V.M. from the same institution in 1934. Following graduation, he served for a time on the staff of the North Shore Animal Hospital at Evanston, Illinois, and later as head of the department of clinical medicine of the Jensen-Salsbery Laboratories, leaving the latter position to enter the Army Veterinary Corps as a captain in January, 1941, to serve with the Arms and Service Group of the Office of the Surgeon-General.

. . . . . .

The Food and Agriculture Organisation of United Nations recently carried out a campaign against rinderpest in the Kwantung and Kwangsi provinces of China. Some 300,000 water buffalo were vaccinated against the disease. As each of these animals is used to plough a piece of land producing about five ton of grain each year, Chinese farmers were able—as F.A.O. justifiably claims—to grow hundreds of thousands of tons more grain than would have been the case had their draught animals succumbed to the disease.

. . . . . .

By a Greek Royal Decree dated March 21st; advertising and sale in Greece of proprietary veterinary medicines is controlled. The sale in Greece of proprietary veterinary medicines of foreign origin may be permitted by the Ministry of Agriculture provided the foreign manufacturer submits (through a representative domiciled in Greece) an application in the form prescribed by the Decree. Manufacturers, representatives, etc., whose products are already being sold in Greece must, within six months from the coming into force of the Decree, make application for renewal of their licences to the Ministry of Agriculture. If applications for renewal are not submitted, the old permit will become invalid in two years.

. . . . . .

A recent visitor to the mainland of Australia was Mr. Alexander Ross, M.R.C.V.S., who came down from Papua to attend the Moral Re-Armament Assembly in Melbourne, and those veterinarians who have met him have been interested indeed to hear of his activities. Mr. Ross is now engaged in mission work among natives who, less than 15 years ago, are said to have been amongst the most difficult of the head-hunters, and he is endeavouring to inculcate into them the first principles of agriculture. He says that he has found them intelligent and most co-operative.—*Australian Veterinary Journal.*

"DRUGS AND THE DOLLAR DROUGHT"

"The decision of the Chancellor of the Exchequer to suspend purchases from dollar areas will affect the drug market as well as many other aspects of our national life," observes *The Pharmaceutical Journal* in a recent issue and continues: "To some extent drug buying from the United States had already been on a reduced scale, as importers had hoped for further reductions in the falling market when this year's crops became fully available. Consequently, some drugs from the Western Hemisphere are not in plentiful supply here. The immediate effect may be a rise in prices for cascara, podophyllum, ipecacuanha, senega, menthol and peppermint oil. The future policy regarding import licences will depend on whether these drugs are regarded as necessary or not. The question of essential medicines was thoroughly investigated during the war, so that expert evidence is readily available. Proprietary products are not imported to any appreciable extent from hard currency areas, as the important American firms have established their factories in Britain. Fortunately streptomycin is now being manufactured in sufficient quantity in this country to fulfil the requirements of the official programme for its use in approved institutions; recent importations have been for private patients. Penicillin is not imported but has augmented our exports for many months. In conjunction with the difficulties in China the new dollar situation has placed the drug market in a worse position than it has been at any time since hostilities ceased over four years ago."

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, July, 1949

List of Successful Candidates

(*Continued from page* 429)

Glasgow

First Examination:

Armour, William
Berger, F. (C)
*Bickerton, D. T.
Borland, A. H.
Bradley, J. A. P. (B)
Calder, H. A. (C)
Craig, James
*Cruickshank, George
*Cullen, Robert
†Ferguson, Angus
†Gibb, J. A.
Gilmour, M. J. (B)
Hutchinson, J.
*Jawara, S. A.
Johnston, W. S. (C)
King, K. M.
Lyon, Miss B. E. (C)
*Mackenzie, Alexander
*McNair, R. C.
Martin, Miss H.
*Prydie, John
*Seawright, David
Slater, D. (C)
Spy, G. McD. (C)
Stewart, G. H. (C)
Taylor, J. L. (C)
*Thom, A.
Towers, Miss I. G. (B)
Torrance, D. S. (B)
*Tudhope, Kenneth
Wallace, D. McL. (C)
West, R. C. A. (C)
Watson, J. M.

† denotes 1st Class Honours.
* denotes 2nd Class Honours.
(C) denotes Credit in Chemistry.
(B) denotes Credit in Biology.

Second Examination:

Anderson, C. C. (P)
Armour, James
Bent, C. L. (P)
Cameron, Miss M. C.
Emmett, F. McL.
Gilchrist, Miss M. (P)
Hamilton, R. C.
Howat, A. N. H.
Howat, W. P.
Hutchison, M.
Laing, D. F. (H)
McLachlan, Iain
*McLaughlan, Ian
*McLeod, A. J.
Macmillan, I. A. (P)
*MacPherson, Robert
Mann, Miss E. M.
Morgan, D. L.
Morris, David
Nicolson, T. B. (P)
Ommer, F. G.
Parkyn, D. R.
Renton, Miss J. P.
Smith, J. H.
Steel, E. R.
Watson, R. C. (P)
Watson, J. G.
Weipers, Mrs. Mary (H)

* denotes 2nd Class Honours.
(H) denotes Credit in Histology.
(P) denotes Credit in Physiology.

Third Examination:

Angus, C. E.
Asher, R. A. (A)
Baird, N. D. (A)
Barton, D. J. (P) (A)
Beck, Robert
Black, A. N.
Brewster, J. R.
Broom, T. M.
Callow, M.
Forrester, W. A.
Gibson, Robert (H)
Goalen, H. McN.
Isbister, James
Lawson, R. B.
Loudon, A. J. B.
*McCulloch, B.
McDonald, A. W. (A)
Murray, G. D.
Parker, F. J.
Pronger, Mrs. F. M. (A)
Schwartz, C.
Scott, W. N.
Smith, J. M.
Southern, J. M.
Strang, J. R.
Vincent, J. F. D.
Taylor, M. H.
*Watkinson, D. E.
White, M. G.
Young, D. K. N.

* denotes 2nd Class Honours.
(P) denotes Credit in Pharmacology.
(A) denotes Credit in Anatomy.
(H) denotes Credit in Hygiene.

Fourth Examination:

Barr, W. M.
Boyd, Hugh
Buchanan, John (Paras)
Campbell, Miss D. J.
Cosgrove, J. P.
Dexter, M. R.
Dickson, Ian
Geddes, Miss M. B.
Gibson, A. C.
Graham, D. T.
Gracie, Archibald
Hall, T. P.
*Hosie, K. F.
Irvine, G. B.
McCrone, R. R. (Paras)
McKay, T. M.
McNicol, O. D.
Macpherson, G. I.
Marshall, A. A. (Paras)
Morris, W. M. S.
Mowat, G. N.
Nisbet, R. M.
Orr, R. S.
Payne, H. M.

Reid, A. N. D.
Roger, S. A.
Sachs, Max
Strachan, T. A.
Vallely, T. F. (Paras)
Wright, E. D.

* denotes 2nd Class Honours.
(Paras) denotes Credit in Parasitology.

FINAL EXAMINATION:

Barclay, J. M.
Bennet, J. R.
Boyd, R. P.
Dunn, T. J.
Glenroy, J. M.
Hair, D. C.
Hamilton, D. F.
Harrison, N. J.
Howieson, J. T.
Jarrett, W. F. H.
Lindsay, T. P.
McMeekin, W. J.
McMillan, W. P.
Millar, J. S.
Russell, David
Sommerville, J.
Spence, Norman
Thomson, E. C.
Wilson, R. L.
Zawodsinski, O. H.

Dublin

FIRST EXAMINATION:

Both Subjects

Deeney, E. E.
†Hatch, C.
Houlihan, T .V.
Liffey, P. K.
*Linton, J. A. M.
McAuley, B.
Tubridy, T. F.

One Subject

Barrett, J. N.
McHale, C. M. J.
Magee, B. F.
Moscow, J. R.
O'Keefe, D. J.
Wright, M. L.

† denotes 1st Class Honours.
* denotes 2nd Class Honours.

SECOND EXAMINATION:

Both Subjects

Deevy, W. E. (P)
Dexter, E. d'H.

One Subject

Agnew, J. N. (P)
Burke, J. (P)
Butler, G. M.
Carolan, E. S. E.
Clarke, J.
Coghlan, D. P.
Conway, D. A.
Cosgrove, J. S. (P)
Darcy, Thomas
Dowling, V. A.
Dougan, P. D. (P)
Fitzmaurice, T. G.
Gallagher, Eugene
Glazier, D. B.
Hart, Francis
Hatch, J. (P)
Johnson, D. P.
Keane, J. J.
Kirkpatrick, R. W. (P)
Lucey, D.
Lyons, T. M.
McClintock, S. J.
McCarthy, Patrick
McLoone, A. G.
Mills, D. R. (P)
Mulligan, T. D.
Murphy, O. J. N.
Murphy, P. A.
O'Connell, B. F.
O'Donnell, O.
O'Dowd, P. W.
O'Loughlin, M. J.
O'Rourke, W. J.
Petris, M. A. (P)
Phelan, J. J.
Roche, L.
Rogers, E. P. S.
Schorman, M. S.
Taaffe, G. F.
Waddell, A. R.

(P) denotes Credit in Physiology.

THIRD EXAMINATION (old syllabus):

Walsh, J. T.

THIRD EXAMINATION (revised syllabus):

Both Subjects

O'Connor, F. M.

One Subject

Blake, J. W. F.
Bourke, P. J.
Carroll, J. N.
Clarke, R. R.
Cox, M. J. A.
Crowe, S. D.
Davies, S. F. M.
Duigan, E. J.
Fagan, J. A.
Fitzpatrick, E. P.
Forde, D. M.
Hogan, M.
Keating, J. P. (H)
Kilmartin, V. J.
Knightly, J. C.
Lunny, K.
Lyons, P. J.
MacBride, J. J.
MacGarry, W. V.
McDougall, W. L.
Mehigan, C.
O'Connor, J. P. (P)
O'Donnabhain, S. S.
O'Reilly, J. P.
Purcell, P.
Ruane, E. J.
Sheehan, G. T. M.

(P) denotes Credit in Pathology.
(H) denotes Credit in Hygiene.

FOURTH EXAMINATION:

Beatty, Miss O. M.
Donovan, D. B.
Downey, N. E.
Geraghty, M. P.
Horan, H.
Keenan, O. M.
Lane, M.
O'Boyle, J. M.
O'Hare, C. C.
Reilly, R.
Slevin, J. G.

FINAL EXAMINATION:

Coghlan, F. Z.
Collins, S. McC.
Connors, N.
Devereux, J. A.
Dineen, Charles
Fanning, J. J.
Gallagher, P. M.
Gilchrist, G. M.
Hannan, P. J.
Hunt, T. J.
Lyttle, C. N.
McCarthy, M.
Mackie, T. A.
McGettigan, J. F.
McNeill, John
Mahon, F.
Murdock, C. A. (M)
Murphy, E. C.
Murphy, P. F.
O'Reilly, G. M. B.
Powell, W. V.
Prendiville, D. B. (M)
Rackard, N.
Ryan, G. M.
Stephens, H. A. P.
Stephenson, J. A. (S)
Thornton, T. J.
Timmins, E. H.
Weir, Edward

(M) denotes Credit in Medicine.
(S) denotes Credit in Surgery.

Liverpool (*Continued*):

THIRD EXAMINATION (revised syllabus):

Both Subjects

Cartmell, W. B.
Croft, D. C.
*Cross, M. H.
Hughes, D. A.
Jessop, L.
Leam, G.
Locke, R. D.
Moss, R. M.
Taylor, H. S.
Theobald, L.
Twist, J. C.
Ward, Miss G. H. (H)

One Subject

Blackburn, P. W.
Briggs, Miss N.
Jones, C. E.
Kealy, J. K. (Dublin) (P)
Magee, Miss M. B.
Meredith, F. W.
Monk, Miss M.
Needham, B.
Smith, G. S.
Stubbs, G. B.
Wells, C. F.
Williams, K. T.
Woolfenden, Miss E.
Unsworth, W. P.

* denotes 2nd Class Honours.
(H) denotes Credit in Hygiene.
(P) denotes Credit in Pathology.

FOURTH EXAMINATION:

Cunningham, B. (Paras)
Forrest, E. (Paras)
Harbourne, J. F.
King, J. J.
Medcalf, Miss R. I.
Owen, L. N. (Paras.)
Parry, R. T.
Pinsent, P. J. N.
Taylor, L. A. (Paras.)
Woodall, H.

(Paras) denotes Credit in Parasitology.

London (*Continued*):

FINAL EXAMINATION:

Allen, P. V.
Ayre-Smith, R. A.
Bainbridge, J. G.
Betts, A. O.
Briault, M. O'M. (M)
Bulbeck, Miss E. C.
Brown, A. M.
Chittenden, Miss P. M.
Clover, R. H.
Collings, D. F.
Collyns, D. J.
Cousens, A. D.
Craven, J. R. E. (M)
Davey, T. E. L.
Dick, D. C.
Drury, F. S.
Fox, R. C.
Frank, C. J. (M)
Goddard, Arthur
Harrison, V. A.
Hartley, D. C.
Hickman, S. J. H.
Holt, J. A.
Hopkin, A. E. (M)
Howard, J. W.
Ibbetson, Miss J. A.
Morris, R. E.
Muse, Herbert
Oldham, J. G.
Oura, Peter
Owens, E. L.
Pengelly, James
Penhale, W. G. A.
Pretty, Miss Y. I.
Rees, J. V.
Rhodes, John
Richardson, John
Roberts, L. W.
Ryde, P. S.
Skyrme, H. P.
Smith, J. E.
Smithson, T. B.
Spittle, R. J. H.
Stockman, M. J. R.

Stockwell, Miss V.
Stubbins, A. G. J.
Teakle, J. A.
Tebbutt, N. F.
Toosey, M. B.
Turner, Miss P. J.
Vaughan, L. C.
*Walker, R. G.
Weaver, Miss B. M. Q.
Whittlestone, J. F.
Whittlestone, Peter
Yeoman, G. H. (S)

* denotes 2nd Class Honours.
(M) denotes Credit in Medicine.
(S) denotes Credit in Surgery.

QUESTIONS IN PARLIAMENT

Horse Slaughter (Committee)

Mr. Janner (July 13th) asked the Minister of Agriculture how many meetings of the Committee appointed under Lord Rosebery to consider the slaughter of horses have so far been held; and when their report is likely to be issued.

Mr. T. Williams: The Committee have so far met once, and a second meeting has been arranged for July 15th. Although it will be necessary to take and study a considerable amount of evidence, I understand that the chairman hopes to have the report ready early next year.

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Horses (Transport)

Brigadier Thorp (July 11th) asked the Minister of Agriculture if he is aware that horses sold for slaughter are being taken long distances by road and thereby being caused unnecessary suffering; and what steps he is taking to prevent this.

Mr. G. Brown: My right hon. Friend is aware that in recent times there has been a tendency for such horses to be carried longer distances by road than formerly, but this need not involve unnecessary suffering. Persons responsible for causing cruelty to animals in transit render themselves liable to prosecution under the Protection of Animals Acts. The Rosebery Committee are no doubt considering whether there should be any further statutory provisions or restrictions on the transport of horses.

Lieut.-Colonel Sir Thomas Moore asked the Minister of Agriculture how many horses have died during transit between Ireland and this country in the course of the three months ended March 31st, 1949.

The Joint Parliamentary Secretary to the Ministry of Agriculture (Mr. George Brown): The returns received by the Department show that one horse died during transit between Ireland and this country during the first three months of this year; and that one other horse was slaughtered on board owing to weakness.

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Horses (Export)

Mr. Viant (July 12th) asked the President of the Board of Trade the number of horses exported from this country during the past 12 months for the purposes of work and also for slaughter.

Mr. Bottomley: The trade returns do not separately distinguish horses which are for work and those for slaughter. In the period June, 1948, to May, 1949, 7,106 horses for all purposes were exported to the value of £3·6 million.

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Sheep Research Farm, Wales

Mr. Goronwy Roberts (July 11th) asked the Lord President of the Council what research is being undertaken by the Agricultural Research Council to improve the quality of mountain sheep upon which much of the success of Welsh hill farming depends.

Mr. H. Morrison: I am glad to inform my hon. Friend that the Agricultural Research Council has decided to purchase a farm in North Wales, where research on the breeding of Welsh mountain sheep will be carried out by the Animal Breeding and Genetics Research Organisation recently set up by the Council under the direction of Professor R. G. White. With the help of the Merioneth Agricultural Executive Committee, a suitable farm has been found near Corwen and final negotiations are in progress for its purchase. This project is distinct from the experimental husbandry farms, one of which will be a hill farm, which my right hon. Friend the Minister of Agriculture and Fisheries is proposing to establish in Wales.

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Cat and Dog Food

Mr. Mott-Radclyffe (July 11th) asked the Minister of Food whether he is aware that the advertised contents of certain cat and dog food include fresh fish and fresh milk; and if he will state the total quantities of these commodities which are being devoted for this purpose.

Mr. Strachey: The use of fresh milk in manufactured cat and dog foods is not allowed, and the only fish normally used in them is fish waste. The hon. Member may be referring to a small quantity of canned fish products imported by private traders, which could not be sold for human consumption, and have had to be sold as pet foods.

Mr. Mott-Radclyffe: May I send to the right hon. Gentleman an advertisement for cat and dog food, known as "Harmony Food," which, according to the advertisement, is made from 50 per cent. fresh fish, 42 per cent. fresh milk and 6 per cent. potato flour? The advertisement says, "It is a scientific food and your pet will like it."

Mr. Strachey: I will willingly investigate that.

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Mastitis (Cure Claim)

Sir William Darling (July 12th) asked the Secretary of State for Scotland why a registered medical practitioner, who claims to have a cure for mastitis and has made offers to his Department, is not allowed to demonstrate this cure without submitting in advance information which might prejudice a fair examination of the claim; and if he will take steps to remedy this situation.

The Secretary of State for Scotland (Mr. Woodburn): The medical practitioner referred to is free to demonstrate his alleged cure for mastitis, but it plainly cannot receive official backing until it has been thoroughly tested by impartial scientific experts. For this purpose details and methods of treatment require to be disclosed. I cannot accept the suggestion that disclosure of this information in advance might prejudice a fair examination of his claim.

Sir W. Darling: The right hon. Gentleman will have in mind that Dr. Jenner had the same difficulty in impressing the value of his cure upon officialdom in his day?

Mr. Woodburn: Yes, Sir, except that to-day, of course, we have scientific methods of testing cures that were not in existence in those days.

Sir W. Darling asked the Secretary of State for Scotland what action has been taken on the evidence submitted to the Milk Committee of Enquiry for Scotland, showing that the milk output might be increased by 15 per cent.; and if any investigation is being made of the validity of this evidence.

Mr. Woodburn: I assume that the evidence to which the hon. Member refers was that submitted to the Committee by the medical practitioner mentioned in the hon. Member's Question to which I have just replied, and was based on his claim to have found a cure for mastitis. I have accordingly nothing to add to what I have already said on this matter.

Sir W. Darling: Is it not the case that this reputable practitioner is prepared to have experiments made at his own expense, if the Department do not insist on disclosing the formula in advance?

Mr. Woodburn: The Department has to be rather careful. There are a lot of people who think they are wonderful inventors. We have to be rather careful how far people can experiment without getting scientific approval.

Sir W. Darling: Would the right hon. Gentleman suggest that the scientific dignity of the Department is more important than a cure for mastitis?

Mr. Quintin Hogg: Is not the disclosure of the nature of a remedy the necessary hall-mark of a reputable medical practitioner?

Mr. Woodburn: Yes, Sir, and in some cases where private practitioners are involved the Department has to be rather careful.

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Tuberculous Cattle, Scotland

Sir W. Darling (July 12th) asked the Minister of Agriculture what is the estimated cost annually arising out of tuberculosis in cattle in Scotland.

Mr. G. Brown: A sum of £609,300 has been provided in the Estimates of the Department for the current financial year in respect of tuberculosis in cattle in Great Britain as a whole. I regret that separate figures for Scotland are not available. This does not include an apportionment of the salaries and expenses of whole-time staff which, I am afraid, it would be impracticable to make.

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Anti-Distemper Serum

Mr. Viant (July 12th) asked the Secretary of State for the Home Department the approximate number of dogs used during the year 1947 in the production of anti-distemper serum; and whether he can give an assurance that animals used in the manufacture of drugs or sera for medical or veterinary purposes are subject to the supervision of the inspectors appointed under the Cruelty to Animals Act, 1876.

Mr. Ede: I cannot give my hon. Friend the figure for which he asks as I am advised that in the production of sera no experiment within the scope of the Cruelty to Animals Act, 1876, is made until the stage when the strength and purity of the product is tested. The number of dogs used in the testing of anti-distemper sera or vaccines during 1947 was approximately 450, and the places where such experiments are made are subject to inspection under the Act.

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Fowl Pest

Mr. John Morrison (July 14th) asked the Minister of Agriculture how many outbreaks of fowl pest have been reported in each of the first six months of this year.

The Minister of Agriculture (Mr. Thomas Williams): There were 45 outbreaks in January, 42 in February, 36 in March, 39 in April, 52 in May and 71 in June this year.

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Pedigree Cattle (Referees)

Mr. H. Fraser (July 14th) asked the Minister of Agriculture whether he will ensure that referees under the Improvement of Livestock Act, 1931, who review the condemnation of pedigree cattle for breeding purposes are themselves expert in the breed being judged.

Mr. T. Williams: Yes, I already do so.

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Ruminating Animals (Imports)

Mr. Janner (July 15th) asked the Minister of Agriculture what steps are being taken to ensure that importations of ruminant animals into this country do not result in the outbreak of epidemics.

Mr. T. Williams: The importation of ruminating animals into Great Britain from countries other than Ireland and Canada is prohibited by the Diseases of Animals Acts, 1894-1937. In certain circumstances, I am empowered to make orders allowing specified animals to be brought into Great Britain, but such orders are made only when I am satisfied that there are adequate safeguards against the risk of introducing disease into this country.

NOTES AND NEWS

Diary of Events

July 29th.—Annual General and Special Meetings of the Sussex Division, N.V.M.A., at Brighton (Old Ship Hotel), 2.30 p.m.

July 29th.—Meeting of the Biochemical Society, in the Biochemistry Department, University College, Dundee, 11 a.m.

Aug. 8th to 13th.—Fourteenth International Veterinary Congress, Central Hall, Westminster, and Church House, Westminster, London, S.W.1.

Aug. 12th to 15th.—Sixty-seventh Annual General Meeting and Congress, N.V.M.A., in London.

August 13th.—Fourteenth Annual Meeting of the Royal (Dick) Veterinary College Alumnus Association, at the Café Anglais, 20-21, Leicester Square, London, W.C.2, 1 p.m.

Sept. 7th.—Meeting of the Southern Counties Division, N.V.M.A., at Salisbury, 6 p.m.

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CONDITIONS OF EMPLOYMENT OF YOUNG GRADUATES

We would draw the attention of intending advertisers in our "Appointments Vacant" column to the request made therein that the salary or salary range offered be stated in their announcements. This request is made in order that the Home Appointments Committee may acquire the evidence requisite for their consideration of the conditions of employment of young graduates, an enquiry in which the Committee is being seriously handicapped by the disappointing response met with hitherto. If, despite the Committee's appeal, any members are not prepared to respond through the medium of their advertisements they are urged, nevertheless, to make the desired information available by advising the Editor of the terms of remuneration offered.

N.V.M.A. Congress Ticket Applications

With recent numbers of the Record there have been issued to members, N.V.M.A., both the programme of papers and events and a Ticket Sheet for applications for tickets for the President's reception and dance (August 12th), the Ladies' Veterinary Guild Theatre Party (August 13th) and for a General Congress Ticket giving admission to N.V.M.A. meeting places at Westminster on August 12th and 13th. Information is also sought (on the ticket sheet) as to members' intention to be present at the Royal Veterinary College on the day of demonstrations (Monday, August 15th). All who have not yet responded are urged kindly to see to this matter at once in order that office work and catering arrangements may be facilitated.

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Dress at International Congress and N.V.M.A. Congress Functions

A number of enquiries have been received at 36, Gordon Square as to the dress which will be most appropriate at the various functions during the Congress week.

The Government Banquet will be for Government Delegates only and lounge suits will be worn.

The Congress Banquet is "dress optional," but it is felt that the majority of gentlemen will wish to appear in either a dinner jacket or a lounge suit.

For the other functions, *i.e.*, Reception by President and Council of the R.C.V.S., and the Reception by the President of the N.V.M.A., evening dress is optional, and, from information available, it seems certain that those who attend in evening dress will find a large number there similarly attired, as will those who attend in a dinner jacket. It is clear that lounge suits will be worn by a sufficient number of members to ensure that those who wish to attend so dressed will feel no embarrassment.

In connection with the Reception by the President of the N.V.M.A., at the Dorchester, on Friday, August 12th, we are informed that a piper has been engaged to play the Eightsome Reel, so that Scots and those of Scottish extraction who wish to appear in the kilt will find it particularly appropriate on this occasion.

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Fourteenth International Veterinary Congress

The Australian and South African Delegations

"The veterinarians who are officially visiting England at the time of the forthcoming meetings of the International Veterinary Congress and of your own Association," writes Colonel Max Henry, Secretary of the Australian Veterinary Association, "are Mr. R. N. Wardle and Mr. H. McL. Gordon. Mr. Wardle is the Director of the Section of Veterinary Hygiene in the Department of Health of the Commonwealth Government. You are probably aware that although most of the veterinary work carried out in this country officially is performed by officers of the States, the Commonwealth Government maintains a veterinary staff to carry out certain work on the Federal level, and Mr. Wardle's duties comprise the application of the Quarantine Act when considering the importation into Australia of animals and animal products from abroad. He is also Chairman of the Cattle Tick Commission, the other representatives being the Chief Veterinary Surgeons of the States of New South Wales and Queensland, and he is the link through which matters of disease control are referred by the State to the Commonwealth Government when considered necessary.

"Mr. Gordon is a senior research officer of the Council for Scientific and Industrial Research. He is well known for his work in connection with parasites of sheep and has published many articles dealing with various phases of infestation both of the internal and external parasites

"It is known also that Mr. D. S. Wishart will be attending the meeting. Mr. Wishart is an officer of the Department of Agriculture in Victoria, and has lately been concentrating on the work of artificial insemination in that State.

"A number of other veterinarians resident in Australia are also members of the International, chiefly as representing different departments and organisations in Australia, but they will not be attending the Congress. It is possible, of course, that the meeting of the National Veterinary Medical Association will be attended by Professor Beveridge, now of Cambridge, and possibly Mr. McDonald of the School of Biochemistry there."

The following officers from the Division of Veterinary Services in South Africa will be attending the International Veterinary Congress: Dr. A. M. Diesel, Deputy Director, Field Section, and Dr. J. I. Quin, Deputy Director, Research Section, Onderstepoort.

PERSONAL

Dr. G. O. Davies Honoured by the University of Liverpool.—His colleagues in the profession and other friends will be pleased to learn that the Council of the University of Liverpool has decided that, as from October 1st, 1949, the title of Reader be conferred upon Gwylm Owen Davies, D.V.SC. (LIV), M.R.C.V.S., D.V.H., "in view of your eminence as a teacher and contributor to the science and literature of veterinary studies."

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Dr. W. R. Wooldridge, Scientific Director of the Animal Health Trust, who has for the past 12 years been an Elective Governor of Birkbeck College, University of London, representing the Old Students, has now, in view of his work as Chairman of the Finance and General Purposes Committee of the governing body, been elected by the Governors as an Independent Co-opted Governor.

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Mr. J. C. Greatorex, M.R.C.V.S., Lecturer in Veterinary Medicine and Pharmacology at the Royal Veterinary College, London, has been elected a Fellow of the Royal Sanitary Institute. Mr. Greatorex has been a Member of the Institute since 1944, when he was also elected an examiner in the Inspection of Meat and Other Foods.

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Births.—KING.—On July 6th, 1949, to Helen Marion, wife of J. O. L. King, M.V.SC., B.SC., M.R.C.V.S., of Neston, a daughter, Felicity Helen.

WALPOLE.—On July 17th, 1949, at Elspeth Nursing Home, to Gwyneth, wife of Robert O. W. Walpole, M.R.C.V.S., a son.

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Deaths.—GARDNER.—At Woodside, Maybole, Ayrshire, on July 8th, 1949, Annie Ferguson, beloved wife of Walter Gardner, M.R.C.V.S., in her 70th year.

HOGG.—On July 16th, 1949, at Modbury, South Devon, Sybil, wife of Major F. Hogg, late R.A.V.C.

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EDINBURGH UNIVERSITY B.Sc. IN VETERINARY SCIENCE

At the Graduation Ceremonial of the University of Edinburgh the undernoted students of the Royal (Dick) Veterinary College graduated as B.Sc. in Veterinary Science: J. D. Anstruther, G. H. S. Ashworth, F. C. Baker, H. R. Binns, B.A. (CANTAB.), C. W. Brown, I. Davidson, J. N. Drake, D. G. Edgar, R. H. Goodhand, J. H. Hall, R. Jones, R. N. Kay, E. P. Lindley, I. G. Munro, J. G. Prescott, J. M'G. Rylands, J. H. Seamer, P. Y. Stead, G. G. Thomson and J. D. Walker.

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The Animal Health Trust

The following items of information, extracted from the July issue of the *Animal Health News* (the Trust's bulletin) will be of interest to our readers.

POULTRY RESEARCH STATION (HOUGHTON GRANGE, HOUGHTON, HUNTINGDONSHIRE)

The new Laboratories have now been handed over to the scientific staff, who are transferring their equipment from the temporary huts in which work has so far been carried on. Although these Laboratories are of "pre-fab" construction, their layout and equipment represent a high level of efficiency and suitability for their purpose, which promises well for the future of this Station. It is anticipated that an official Opening Ceremony will be held in the autumn.

Breeding and Hatching.—The hatching season is now finished, and the Station is now rearing 1,500 chicks. Approximately 1,000 of these are under progeny test in an intensive house; while 350 are being progeny tested on trap nests in field huts. Fertility and hatchability have proved to be of an extremely high order, and rearing losses have been abnormally low. Interesting details are being kept regarding mortality rates and causes, growth and weight gains, food consumption and labour costs. A report of the first year's breeding and hatching is in preparation.

The Poultry Research Station urgently requires groups of turkey poults for experimental work in blackhead. Dr. Gordon is also eager to set up two small pens of geese and ducks, so that work can be carried out on these species: again, he appeals for gifts in kind.

Staff Change.—Dr. K. S. Chodnik, until recently Pathologist at the Poultry Research Station, has now left the Staff in order to proceed to Australia. He has been replaced by Mr. C. le Q. Darcell, M.R.C.V.S., who has held one of the Trust's Research Training Scholarships at Cambridge University, where he has taken Pathology in his Tripos. Mr. Darcell is the son of an Accredited Poultry Breeder in Kent.

CATTLE RESEARCH STATION (HOUGHTON GRANGE, HOUGHTON, HUNTINGDON)

Work has proceeded steadily on the improvement and reorganisation of the farm itself, on laying the foundations of a healthy herd, and on the construction and conversion of buildings essential to the scientific programme of the Research Station. Professor A. N. Worden is now in residence, and technical staff are being recruited.

CANINE RESEARCH STATION (KENNETT, NEAR NEWMARKET, SUFFOLK)

Veterinary and Medical Co-operation.—Linked with the investigation of night blindness in Irish Setters was some special work undertaken for Professor Sorsby of the Royal College of Surgeons, in connection with night blindness in human beings. As a gesture of appreciation of valuable help in this study, the R.C.S. have now sent Mr. John Hodgman, M.R.C.V.S., Director of the Station, a cheque for £100 as a donation towards the Trust's expenses.

EQUINE RESEARCH STATION (BALATON LODGE, NEWMARKET, SUFFOLK)

Second Studsmen's Course.—Last year, at the request of the Thoroughbred Breeders' Association, the Trust undertook to hold courses for selected Studsmen, recommended by members of the Association as likely to become efficient studgrooms after special instruction and further experience on their studs. The second of these courses was held this year in May, for men from private studs. The tuition was confined to fundamentals of stud management, and was dealt with from the studsmen's angle. Every opportunity was taken to emphasise that the man in charge of a stud could—and should—work in the closest co-operation with the veterinary surgeon, to the great advantage of both sides. It is felt that the main object in running the courses is being achieved—namely, to give studsmen an opportunity to acquire sound theoretical and practical knowledge of their work in accordance with modern principles of maintaining horses under the best and healthiest conditions. The Trust hopes to arrange the third course in this series—this time mainly for nominees from public studs—in November next.

"The British Racehorse."—The first issue of this new magazine, which appeared in June, contains an article entitled "How Science Helps Breeders," by Professor Wm. C. Miller, M.R.C.V.S., F.R.S.E., Director of the Equine Research Station. The same issue contains an aricle by Dr. J. A. Burkhardt, M.R.C.V.S., on "Sperm Survival Intervals." It is hoped that other articles dealing with the Trust's research activities in the equine field will be published shortly.

The new magazine is edited by David Livingstone-Learmonth, and published by "The British Racehorse," Turf Newspapers, Ltd., 55, Curzon Street, London, W.1. It can be ordered direct or through any bookseller.

Animal Health Trust Hostel and Library.—The house at Lanwades Park is being converted gradually into a hostel and study centre for visiting scientists and students. A number of individual studies and living-rooms have now been made available for this purpose, but furniture has yet to be acquired.

The nucleus of what it is hoped will one day be a first-class Library also exists at Lanwades Park. This will cover every aspect of the Trust's programme, including the health and disease problems of every domesticated animal in this country.

The Council of the Trust make known these projects in the hope that persons having books, furniture, library shelving, etc., will be generous in helping to equip the Hostel and Library. With such help the Trust can make Lanwades Park a centre, not only of learning and enquiry in animal health matters, but also of international goodwill.

Bloodstock Industry Appeal.—The Trust's appeal to the Bloodstock Industry continues to receive active support, thanks to the admirable work of the Bloodstock Committee under the chairmanship of Major Durham Matthews, O.B.E. The Secretary of the Committee is Colonel George Barnett, O.B.E., M.C., M.R.C.V.S., who is also secretary of the Research Station.

Recent generous help comes in the form of nominations to Honeyway (Lord Milford), Sayajirao (HH. the Maharajah of Baroda) and Full Bloom (Captain E. A. Ingram). These nominations—which, it is hoped, will be followed by others—will probably be sold at Doncaster in September.

APPEALS COMMITTEE

A new Committee of the Trust has recently been set up under this title at the invitation of the President, the Duke of Norfolk. Its duty will be to co-ordinate and control the various appeals for funds on behalf of the Trust. The Chairman is Mr. R. Bolton, Managing Director of Agricultural Food Products, Ltd., and this year Vice-Chairman of the Farmers' Club. The Committee includes in its membership persons prominent in agriculture and general livestock interests, and in the business firms associated with livestock and livestock products.

Membership "Drive."—At its second meeting last month, this Committee launched a "drive" to secure the largest possible number of regular subscribers to the Trust. This followed a statement by Dr. W. R. Wooldridge, Scientific Director and Chairman of Council, that, if the Trust's full programme is to proceed unhampered and give its full benefit to the community as a whole, the Trust's present income must be very considerably enhanced without delay. It should be recorded, however, that the income this year has again exceeded that of the previous year—an indication of the public's growing appreciation of the importance of the work of the Trust.

Classes of Membership.—Classes of membership approved, with subscription rates and privileges, are set out below. It is anticipated that, as time goes on, the privileges will be extended for certain classes.

Youth Member (under 18 years of age).—Five shillings a year minimum subscription.

Associate.—Subscriptions and donations below One Guinea a year.

Animal Health Member.—One Guinea a year, or more.

Animal Health Fellow.—Ten Guineas a year, or more.

These subscriptions have been set out as *minimum* rates in the confident hope that many subscribers will be prepared to give larger sums.

All those subscribing a guinea a year or more will, during their year of membership, receive free of charge the Trust's Annual Report, and Progress Reports of research done. They will also be entitled to avail themselves, through their veterinary practitioner, of the Trust's diagnosis and consultative services when these are fully established.

Application forms and full details can be obtained from the Organising Secretary at Trust Headquarters.

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LEGAL NOTES

Milk Fat Deficiency Charges Fail

Veterinarians' Evidence of Importance of Feeding-stuffs Factor

A defence plea that milk alleged to have been deficient in fats was exactly as it came from the cows succeeded at Tamworth on May 6th, when two summonses against John Randle Stonier, a farmer, of Newton House, Newton Regis, were dismissed.

Stonier, who pleaded "Not guilty" and said he had 270 pedigree Friesian cattle, told the court that an experiment in feeding them with silage kale gave a greater milk yield but reduced the fat content. He said the experiment was carried out for the Warwickshire Agricultural Committee.

Mr. G. C. Jenkins, Chief Inspector of Weights and Measures for Staffordshire, who explained that Stonier was under contract to sell his milk to the Milk Marketing Board, said it was collected from his farm by Mr. J. P. Rutherford, of The Leys Model Dairy, Tamworth. On February 24th, said Mr. Jenkins, a sampling officer visited the dairy and took samples from seven churns of milk consigned by Stonier. Two of them contained 2·80 and 2·48 per cent. of fat, compared with the 3 per cent. minimum required. Samples taken on the farm on the two following days were satisfactory.

Mr. H. C. Clifford (defending) pointed out that it was not an offence to sell milk with a fat content of less than 3 per cent. if it could be shown that the milk was exactly as it came from the cow and nothing had been added or subtracted.

Stonier's case was that the milk was exactly as it came from the cow. On February 24th he consigned just over 63 gallons of milk to the dairy, and the fat content of all of it was 3·46 per cent.

Official records given him by the Milk Marketing Board every six weeks showed that milk from individually named cows frequently fell below the 3 per cent. fat content.

Since the war it had been impossible to obtain normal feeding-stuffs, and on February 14th he began the experiment of feeding silage kale to his cattle. Because of its bitter acid taste he had difficulty in getting the animals to take the feed, but eventually it was possible to feed them 15 lb. per head per day.

Professor W. C. Miller, M.R.C.V.S., F.R.S.E., said there was quite a lot of evidence to show that the inherent variation in the milk of cows could lead to a lowering of butterfat content both individually and in bulk. It was well known that morning milk was generally lower in butterfat content and evening milk higher. There was no consistency between day to day figures. In the case of British Friesians the milk yield was greater than in most other breeds but the fat content tended to be a little lower. The difficulty in obtaining feeding-stuffs could result in a greater number of samples of milk falling below the legal minimum. Of the 165 cows recorded in the annual report of the Milk Marketing Board, there were 53 that had throughout the year given milk of an average standard below 3 per cent., and 14 that had just managed to reach 3 per cent. They had to remember that the 3 per cent. minimum was a Statute of Westminster, but the cow did not know that she did not have to fall below that figure.

Mr. H. W. Steele-Bodger, M.R.C.V.S., said it was generally recognised that hay and silage produced this last year had been markedly deficient in protein. Since the war many of the best herds in the country had had difficulty with fat content. That applied to all herds and more particularly to British Friesians, which had a normally low butterfat content.

After a retirement, the Mayor said the Bench had come to the conclusion that the defendant had satisfied them the milk as sampled was as it came from the cow and they would dismiss the case.

* * * * *

Sterilisation of Syringes

In its issue of June 18th *The Pharmaceutical Journal* reviews, as follows, the findings of a commission set up by the Swiss Society of Surgery to investigate methods of syringe sterilisation (published, *Sterilisation und sterile Aufbewahrung von Spritzen und Hohlnadeln*, by Ernst Baumann: Benno Schwabe & Co., Basle). "Four absolute methods of sterilisation are described, of which only two are to be found in the Medical Research Council memorandum on the same subject (War Memorandum No. 15, 1945). When sterilisation is to be effected in the hot-air oven, the report recommends that syringes be dismantled, packed singly, and heated at 180° C. for one hour or at 200° for half an hour. The browning of cotton wool is suggested as a convenient and satisfactory indication that sterilising conditions have been reached and maintained. At temperatures below 180° sterility cannot be guaranteed. In addition to exposure to steam under pressure (45 minutes at 120°, 25 minutes at 127°, or 20 minutes at 138°) a method of sterilisation described is that of heating in water under one atmosphere pressure (120°) for 20 minutes. In certain circumstances advantages are claimed for this procedure.

"The fourth method is that of boiling the dismantled syringes in an antiseptic solution for 15 minutes. The solutions mentioned are: 2 per cent. hydrated sodium carbonate with or without the addition of 0·1 per cent. formalin, 2 per cent. Desogen solution (a quaternary ammonium compound), and 1 in 20,000 Merfen solution (phenylmercuric borate). For the prevention of rusting of needles, 0·5 per cent. sodium nitrate should be added to all of these solutions. The syringe should be rinsed with sterile distilled water (from an ampoule) before drawing in the solution for injection. To demonstrate that no incompatibility is likely to occur between small amounts of antiseptic and certain medicaments, pharmacological experiments are described in which syringes which had been in contact with solutions containing sodium nitrate and Desogen were used for making injections. No untoward reactions were observed with adrenaline, procaine, insulin, vitamins A, B_1 and C, penicillin and certain hormones.

"When a syringe is to be employed for operations in which the risk of infection is small, it is permitted to lay the syringe in an antiseptic liquid between operations. For this purpose four solutions are mentioned: 5 per cent. formalin in 76·5 per cent. v/v alcohol, 5 per cent. Desogen with 0·5 per cent. sodium nitrite, 2·5 per cent. formalin with 0·5 per cent. liquefied phenol and 1·5 per cent. borax, and 1 in 20,000 Merfen solution containing 0·5 per cent. sodium nitrite. The addition of 1·5 per cent. glycerin to all of these solutions is advantageous. The syringe is immersed in the antiseptic liquid for at least 15 minutes. It is emphasised that this procedure is not an absolute method of sterilisation.

"The final section of the report compares the findings of the Swiss committee with those of the M.R.C. It is recalled that in the memorandum of the latter body only the hot-air oven and the autoclaving processes are recognised as absolute for production of sterile syringes. The times and temperatures for these processes mentioned in the two reports are markedly different. Boiling in distilled water under pressure is a method only found in the Swiss report. The M.R.C. recommendation that in the absence of an autoclave or hot-air oven glass-metal syringes may be 'sterilised' by boiling in water and all-glass syringes by immersion in alcohol (70-75 per cent. v/v) is severely criticised. It is pointed out that neither process is effective against certain spores and that pathogenic sporing organisms have been found in alcohol. The M.R.C. committee was aware of these facts but could not recommend chemical disinfectants in general to sterilise all-glass syringes because it was believed that the antiseptic substances might damage or destroy the material to be injected. The Swiss committee claims that the use of any of the antiseptic liquids described would reduce the risk of infection and that after the syringe had been rinsed with sterile water the quantity of antiseptic remaining would have no significant effect on sensitive medicaments.

"The conditions for sterilisation of apparatus, instruments and medicaments will no doubt eventually be discussed on an international level, and will lead, it is hoped, to uniform directions appearing in the official and non-official publications of different countries."

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Poisoning of Farm Animals by the Marsh Ragwort (*Senecio aquaticus* Huds.)

W. Charles Evans and E. T. Rees Evans, of the Department of Animal Health, University College of Wales, Aberystwyth, make the following contribution to the issue of *Nature* of July 2nd:

Eleven *Senecio* spp. have been reported to occur in the British Isles[1], but only a few of these contaminate pasture land to any appreciable extent. The common ragwort (*Senecio jacoboea* Linn.) has been incriminated in Britain[2,3,4] and elsewhere[5,6] as the cause of a fatal poisoning when eaten by livestock, known generally as "seneciosis." This condition, in cattle and horses, may either take a rapid fatal course with the liver showing acute necrosis, or a more lingering chronic type with liver cirrhosis as the main lesion.

Into one knackery in Pembrokeshire, during the period September, 1947, to August, 1948, there was an intake of 51 animals diagnosed as having died of seneciosis. The predominant species infesting the pasture in this area is *Senecio jacoboea* Linn., and eradication trials using selective weed-killers have so far yielded promising results[7]. In Carmarthenshire, seneciosis, mainly in horses, has occurred on farms where the land is heavily infested with the marsh ragwort (*Senecio aquaticus* Huds.); there was no clear published evidence of the toxicity of this species[8]. Quantities of the plant were collected at the flowering stage from fields in the area, and also from cured hay on the actual farms where losses had occurred. [Here the writers describe the procedure by which a crystalline *Senecio* alkaloid was isolated from *S. aquaticus* from both sources.]

This alkaloid differs in its constants and derivatives from those already isolated from other *Senecio* spp. and listed by de Waal[9] (also Henry[10]); to indicate its origin we propose to call it "aquaticine". Further work on its chemical nature and relationship to the other *Senecio* alkaloids awaits the collection of an adequate bulk of material.

Feeding experiments using rats amply demonstrated the toxic nature of *S. aquaticus*; inclusion of the dried and milled plant to the extent of 20 to 40 per cent. of the ration caused rats to become unthrifty, with death within three weeks, the animals showing lesions typical of seneciosis. Dosages of 3 to 7 mgm. of pure aquaticine acetate injected subcutaneously invariably killed rats of 60 to 70 gm. weight within 48 hours. At death, the carcases were jaundiced, and showed intestinal haemorrhages, capillary congestion of the lungs, vascular changes in the liver varying from congestion of the blood vessels to marked haemorrhagic areas with resulting necrosis; the kidneys showed changes, varying from congestion of glomeruli and oedema into Bowman's capsule, to necroses of the convoluted tubules.

Aquaticine inhibits the movements of the isolated rabbit intestine, the effect being quite marked at a dilution of 1:50,000.

These results indicate that the marsh ragwort, *Senecio aquaticus*, is probably as toxic to livestock as some of the other species of *Senecio* are known to be.

Thanks are due to Dr. P. Thomas for identification of botanical species. This work has arisen from a survey of causes of death and incidence of disease in farm animals, carried out by one of us (E. T. Rees Evans) and supported by the Agricultural Research Council, to which body acknowledgment is made. One of us (W. Charles Evans) thanks the Royal Society for a grant.

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CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible

XIVth International Veterinary Congress

Sir,—Once again London is to be the venue of an International Veterinary Congress. The choice of Great Britain is an honour and an unexpected one, as the last Veterinary Congress to be held in London was so comparatively recent as 1930. No Congress has been held since the last Congress in Switzerland in 1938, and during the intervening period remarkable advances have been made in veterinary medicine towards the control of diseases amongst livestock.

The need of expansion of livestock products during the period of hostilities contributed very markedly to the quick introduction into general practice of new means of limiting losses of production. In this respect the time lag so often observed in the past in the application of new methods was eliminated, but the cessation of hostilities has left many problems, and particularly the question of adequate supply of food for man.

The XIVth International Congress, therefore, will be based strictly on the needs of the moment, and the means whereby the veterinary profession can best play its part in the world crisis.

In my former position it was my privilege to represent His Majesty's Government in every part of the world, and I know the warm regard in which the veterinary profession in this country is held by veterinarians all over the world, and what interest is felt in our methods and research.

Many of the most eminent veterinarians from overseas will be attending the Congress. They will want to meet veterinarians in this country representing all interests. May I appeal, therefore, to every member of the veterinary profession to become a member of the Congress, and to help in the reception of veterinary colleagues who are anxious to discuss every form of problem.

Yours faithfully,
D. Cabot
(*President, Organising Committee*).

XIVth International Veterinary Congress,
10, Red Lion Square,
London, W.C.1.
July 11th, 1949.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
June 16th to 30th 1949	4	—	36	—	—	—
Corresponding period in—						
1948	—	—	16	—	—	3
1947	3	6	92	—	2	1
1946	2	2	—	—	2	10
Jan. 1st to June 30th, 1949	100	11	285	—	28	5
Corresponding period in—						
1948	47	—	206	1	26	20
1947	47	98	542	1	25	16
1946	51	28	—	4	36	275

NOTE.—The figures for the current year are approximate only.

* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at June 30th, 1949, was as follows:—

England	Wales	Scotland	Total (Great Britain)
15,922	13,195	11,627	40,744